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Note on the Track of the Total Phase in the Solar Eclipse of 1885, *Sept.* 8, *in its passage across New Zealand.* By J. R. Hind, LL.D., F.R.S.

The only land traversed by the central line in the total eclipse of the Sun in September next will be the southern part of the north island and the northern part of the south island of New Zealand, where the eclipse occurs early on the morning of the 9th, civil reckoning. The following are points in the central line corresponding to the annexed Greenwich mean times, with the duration of totality on that line. The positions of Sun and Moon, and the semi-diameters, have been taken from the *Nautical Almanac*:—

Greenwich M.T.				Long. E.	Lat. S.	Duration of totality.
		h	m	° ′	° ′	m s
Sept.	8	8	2	171 28·5	40 28·5	1 50·3
		8	3	172 47·2	40 33·3	1 52·5
		8	4	173 59·1	40 38·8	1 54·6
		8	5	175 5·7	40 44·8	1 56·5
		8	6	176 8·2	40 51·3	1 58·4

On referring these points to the Admiralty general chart of New Zealand, it will appear that the central eclipse enters the south island between Wanganui Inlet and Cape Farewell, and leaves the north island a little north of Castle Point, near which will be the most favourable position for observation. Taking the position of Cape Farewell in longitude 172° 43 E., latitude 40° 30′·5 S., the total eclipse begins Sept. 8, at $19^{h}\ 32^{m}\ 49^{s}$ local mean time, and continues $1^{m}\ 52^{s}$, with the Sun at an altitude of about 15°. For any point near Cape Farewell the Greenwich mean time (t) of beginning and ending of the total phase will be given by the formulæ

$$\cos\omega = -113{\cdot}1590 - [2{\cdot}09859]\sin l + [1{\cdot}62923]\cos l\,.\cos(\lambda - 162^{\circ}\ 3'{\cdot}3)$$

$$t = 8^{h}\ 58^{m}\ 31^{s}{\cdot}1 \mp [1{\cdot}74986]\sin.\omega - [3{\cdot}36498]\,.\sin l$$
$$- [3{\cdot}85019]\,.\cos l\,.\cos(\lambda - 146^{\circ}\ 20'{\cdot}4)$$

Here l is the *geocentric* latitude, and λ the east longitude, from Greenwich, taken positive. The upper sign is to be used for the beginning, and the lower sign for the ending. The quantities within the square brackets are logarithms.

The position of Castle Point, read off from the chart, is in longitude 176° 14′ E., latitude 40° 54′ S., and a direct calculation gives the commencement of totality at $19^{h}\ 50^{m}\ 8^{s}$ local mean time, and duration of totality $1^{m}\ 58^{s}{\cdot}6$, the Sun's altitude

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about 18°. For any neighbouring position the beginning and ending of the total phase may be determined from the expressions

$$\cos\omega = -110{\cdot}2757 - [2{\cdot}08444]\sin l + [1{\cdot}62804]\cos l\,.\cos(\lambda - 160^\circ\ 52'{\cdot}8)$$

$$t = 8^{\mathrm{h}}\ 58^{\mathrm{m}}\ 13^{\mathrm{s}}{\cdot}6 \mp [1{\cdot}77303]\sin.\omega - [3{\cdot}38763]\sin l$$
$$- [3{\cdot}85920]\cos l\,.\cos(\lambda - 145^\circ\ 34'{\cdot}2)$$

At Wellington totality begins at 19h 44m 9s local mean time, and continues 1m 31s. At Nelson it begins at 19h 37m 22s, and continues 1m 11s.

The Greenwich time of commencement of the eclipse, near Castle Point, may be found from the expressions

$$\cos\omega = -1{\cdot}55171 - [0{\cdot}24636]\sin l + [9{\cdot}74289].\cos l.\cos(\lambda - 178^\circ\ 48'{\cdot}8)$$

$$t = 9^{\mathrm{h}}\ 2^{\mathrm{m}}\ 51^{\mathrm{s}}{\cdot}9 - [3{\cdot}57430]\sin\omega - [3{\cdot}29927]\sin l$$
$$- [3{\cdot}82250]\cos.l.\cos(\lambda - 161^\circ\ 21'{\cdot}5)$$

The contact takes place at about 62° N. to W. (direct). For Castle Point the equations give the partial beginning at 18h 45m 47s local mean time. The Sun will be at an altitude of 6½°.

With regard to the latitude limits of total phase, they may be stated approximately at +49′ for N. limit and −50′ for S. limit, but a closer computation appears unnecessary. For satisfactory observation during the totality of the approaching eclipse, the observer must place himself as nearly as practicable upon the central line. It will be found that the above determination of its course, from my own computations, agrees closely with that indicated in the *American Ephemeris.*

The Observations of the Moon made at the Radcliffe Observatory, during the year 1884, *and a Comparison of the Results with the Tabular Places from Hansen's Lunar Tables.* By E. J. Stone, M.A., F.R.S.

The present paper contains the Right Ascensions and North Polar Distances of the Moon as deduced from the observations made at the Radcliffe Observatory during the year 1884. I have compared these results with those deduced from Hansen's Lunar Tables on two suppositions:—

1. That the mean times, found in the usual way from the sidereal times at mean noon given in the *Nautical Almanac*, were not changed in 1864.
2. That the mean times were changed in 1864, in accordance

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